

Section-A

Multiple Choice Questions (MCQ's)

Q.1 Select the correct answer for each from the given options:

- (i) Solution set of $xy + 2 = -4$ is _____
 (a) 18 (b) ± 4 (c) $\{ \}$ (d) None of these
- (ii) $(\sin 45^\circ)^2 + (\cos \dots)^2 = 1$
 (a) 90° (b) 60° (c) 45° (d) 30°
- (iii) In 12, 13, 4, 4, 5, 7, 9 the mode is :
 (a) 3 (b) 5.5 (c) 4 (d) 9
- (iv) $\frac{\log_5 3}{\log_5 2} =$ _____
 (a) $\log_5 2$ (b) $\log_5 3$ (c) $\log_3 2$ (d) $\log_2 3$
- (v) $\begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$ is a _____ matrix:
 (a) Rectangular (b) unit (c) Scalar (d) diagonal
- (vi) The characteristic of $\log 5.723$ is :
 (a) 1 (b) -1 (c) 0 (d) 2
- (vii) A circle passes through all the vertices of a triangle is called:
 (a) Segment of circle (b) Circum circle of triangle
 (c) Inscribed circle of triangle (d) Escribed circle of triangle
- (viii) Cartesian product of sets A and B is written as.
 (a) A.B (b) A x B (c) A Δ B (d) B x A
- (ix) {2, 4, 6,} is the set of:
 (a) Prime number (b) Odd number (c) Even number (d) Whole number
- (x) The polynomial expression $x^2 + 7x + 3$ w.r.t the terms is called;
 (a) Binomial (b) Trinomial (c) Monomial (d) None of these
- (xi) If $\log_{10} 1000 = y$ then $y =$ _____
 (a) 2 (b) 3 (c) 10 (d) 5
- (xii) The value of $\sin 45^\circ =$ _____
 (a) 2 (b) $\frac{1}{2}$ (c) -2 (d) $\frac{1}{\sqrt{2}}$
- (xiii) $(a+b)^2 - (\dots) = 4ab$
 (a) $a-b$ (b) $a+b$ (c) $(a-b)^2$ (d) $(a+b)^2$
- (xiv) In scientific notation 0.000537 is written as;
 (a) 0.573×10^{-4} (b) 5.73×10^{-4} (c) 57.3×10^{-5}
 (d) 0.0573×10^{-2}
- (xv) $x^3 - x^2 + 2 =$ _____
 (a) $(x-1)(x^2 + 2x + 2)$ (b) $(x+1)(x^2 - 2x - 2)$
 (c) $(x+1)(x^2 + 2x - 2)$ (d) $(x+1)(x^2 - 2x + 2)$
- (xvi) $\frac{a^9}{a^2} =$ _____
 (a) a^{11} (b) a^7 (c) a^{18} (d) None of these
- (xvii) The H.C.F of $x^3 - 8$ and $x^4 - 16$ is _____
 (a) $(x^3 - 8)(x^4 - 4)$ (b) $x^4 - 4$ (c) $x^3 - 2$ (d) $x + 2$
- (xviii) If $(x-2)(x+3) = 0$, then $x =$ _____
 (a) -3, -2 (b) 3, 2 (c) -3, 2 (d) 3, -2
- (xix) An angle greater than 90° is called _____
 (a) Acute angle (b) Obtuse angle (c) right angle (d) None of these
- (xx) The triangle having no sides congruent is called _____
 (a) Isosceles triangle (b) Scalene triangle (c) Equilateral (d) Acute triangle

Section-B

Note: Solve any TEN of the following questions. Each question carries 05 marks.

- Q.2 Define any TWO of the following and draw figure.
 Triangle Transversal Diameter
- Q.3 Prove that $\cos^2 \theta - \sin^2 \theta = 1 - 2\sin^2 \theta$
- Q.4 Find H.C.F of $x^2 + x - 2$, $x^3 + 2x^2 + x + 2$ by division method.
- Q.5 If $A = \{a, b\}$, $B = \{2, 3\}$ and $C = \{3, 4\}$ find the value of:

- (i) $A \times (B \cup C)$ (ii) $A \times (B \cap C)$

Q.6 Find the value of $x^2 + \frac{1}{x^2}$ when $x = 2 + \sqrt{3}$

Q.7 Describe the advantages and disadvantages of mode.

Q.8 What should be added to $x^4 + 4x^3 + 10x^2 + 14x + 7$ to make it perfect square.

Q.9 Eliminate "y" from the following equations.

$$\frac{y}{b} + \frac{b}{y} = 2c, \quad \frac{y^2}{b^2} + \frac{b^2}{y^2} = a^2$$

Q.10 Simplify: $\frac{1}{4a^2 - b^2} - \frac{1}{2a - b} + \frac{1}{2a + b}$

Q.11 Two numbers are in the ratio of 13:11 and their difference is 12. Find the numbers.

Q.12 Construct a triangle ABC in which $m\overline{AB} = 5\text{cm}$, $m\angle B = 105^\circ$ and $m\overline{BC} = 4\text{cm}$
 Draw its circumscribed circle.Q.13 Find the value of $\frac{0.87}{(28.9)(0.985)}$ with the help of logarithm.

Q.14 Factorize any TWO of the following:

- (i) $x^2 + 15x - 100$ (ii) $a^4 + a^2 + 1$ (iii) $8x^3 - 27y^6$

Q.15 The sum of two algebraic expression is $4x^2 - 3x^3 + 2x^2 - a$, if one of them is $2x^4 + x^3 - x^2 + 2a$, then find the other.

Section-C

Note: Solve any THREE of the following questions. Each question carries 10 marks.

Q.16(a) Find the L.C.M of the given polynomials by factorization

$$x - y, \quad x^2 - y^2, \quad x^3 - y^3 \text{ and } x^4 + x^2y^2 + y^4$$

(b) Solve the equations: $x + y = 4$, $2x - 1 = 5y$ Q.17 (a) Solve the triangle ABC where $m\angle C = 90^\circ$, $c = 10\sqrt{2}$ cm and $a = 10$ cm.(b) A tree of 180 dm height on one bank of the river makes angle of 30° directly on the opposite side of the river. Find the width of the river.

Q.18 (a) Prove that, if two sides of a triangle are congruent then the angle opposite to them are also congruent.

(b) Draw a circle with radius 4.5 cm. Draw a tangent at a point M to the circle.

Q.19 (a) A father is twice old as his son, 8 years back their ages were in the ratio of 8:3. Find their present ages.

(b) If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 5 \\ 3 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 3 & 1 \\ 2 & -1 \end{bmatrix}$ then prove that $A(B + C) = AB + AC$ Q.20 If $U = \{1, 2, 3, \dots, 20\}$, $A = \{1, 2, 4, 8, 10, 16, 20\}$ and $B = \{2, 8, 8, 10, 14, 18\}$, then verify De Morgan's Laws.